

Seminar On

**Multi-Physical Synthesis of Complex RF Circuits**

**Using Integrated MEMS Devices on a Novel Silicon-Ceramics Compound Substrate**

by

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**Date : 08 November 2016 (Tuesday)**  
**Time : 03:00 pm – 04:30 pm**  
**Venue : Room 15-202, meeting room of State Key Laboratory of Millimeter Waves,  
15/F, Lau Ming Wai Academic Building, City University of Hong Kong**

**Abstract**

The key constituents of microelectromechanical systems (MEMS) are mechanically flexible devices on the micrometre scale, where the mechanical motions can be excited and detected by electrical signals. The presentation focuses on research which aims to include the basic functions of MEMS at high frequencies, such as control, oscillation, and switching, into the design of complex radio frequency (RF) circuits. Through the combination of microelectronic and micromechanical properties at device, circuit, and system levels, a novel circuit technology “RF micromechatronics” is made accessible.

First, a general overview on the project is given, followed by some examples of the multi-physical design approach. Some recent results of our cooperation with Dr. Joshua Lee and his team at CityU are presented. Secondly, the novel SiCer substrate technology is introduced and their unique features are explained at selected applications. In the third part of the presentation, the design of an oscillator, based on a 600MHz MEMS resonator, is shown. The self-designed ASIC core is processed in a 180 nm CMOS technology.

**Biography**

**Uwe Stehr** received his Dipl-Ing degree from the Technische Universität Ilmenau in 1991. He was then a scientific assistant at the University Duisburg-Essen for 15 years, working on RF CMOS design of application-specific integrated circuits (ASIC), especially for frequency generation (VCO, PLL, XO circuit blocks). In July 2015, he joined the “RF and Microwave Research Group” at the Technische Universität Ilmenau where he coordinates interdisciplinary multi-physical research on efficient and reconfigurable RF MEMS circuits in the framework of the research unit MUSIK funded by the German Research Foundation (DFG). His main research interest is in the integration of the design flow of mechanical (MEMS-based) and electrical (e.g. CMOS) circuit functions using a compound silicon ceramics multilayer substrate technology.

**Johannes Stegner** received his M. Sc. degree in electrical engineering and information technology from Technische Universität Ilmenau in 2015. Currently, he is working towards his doctoral degree in electrical engineering at this University, in the “RF and Microwave Research Group” headed by Prof. Matthias Hein, on integrated MEMS oscillator circuits. Since March 2015, he is part of the academic staff of the research unit MUSIK funded by the German Research Foundation (DFG).

**Sebastian Gropp** received the master degree in mechatronics from Technische Universität Ilmenau in 2012. Currently, he is a doctoral student at this University and Member of the academic staff of the Institute of Micro- and Nanotechnologies “MacroNano®”, focusing on the development of RF- MEMS on Silicon-Ceramic-Composite-Substrates within the research unit MUSIK funded by the German Research Foundation (DFG).

\*\*\* ALL ARE WELCOME \*\*\*

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